P - NUCLEAR POWER PLANT LOCATIONS

Just as knowing potential nuclear attack sites is important, so is knowing where nuclear power plants and testing and research facilities are. The following pages include a map of power plants and testing and research facilities throughout the state. This section also contains a listing of power reactor units with the plant name, reactor type, location, ownership, and the Nuclear Regulatory Commission (NRC) region. An incident at a nuclear facility can have very similar effects to a nuclear attack. Winds can carry radioactive material hundreds of miles. Also included in this section is a fact sheet regarding the decommissioning of nuclear power plants (with some located in Michigan including Fermi I in Monroe County), and a list of test and research reactors (some located in Michigan).

List of Power Reactor Units

For more information, see Map of Power Reactor Sites and our annually published Information Digest, Appendix A.

Plant Name Docket Number	Reactor Type	Location	Owner/Operator	NRC Region
Arkansas Nuclear 1 05000313	PWR	6 MI WNW of Russellville, AR	Entergy Operations, Inc.	4
Arkansas Nuclear 2 05000368	PWR	6 MI WNW of Russellville, AR	Entergy Operations, Inc.	4
Beaver Valley 1 05000334	PWR	17 MI W of McCandless, PA	FirstEnergy Nuclear Operating Co.	1
Beaver Valley 2 05000412	PWR	17 MI W of McCandless, PA	FirstEnergy Nuclear Operating Co.	1
Braidwood 1 05000456	PWR	24 MI SSW of Joilet, IL	Exelon Generation Co., LLC	3
Braidwood 2 05000457	PWR	24 MI SSW of Joilet, IL	Exelon Generation Co., LLC	3
Browns Ferry 1 05000259	BWR	10 MI NW of Decatur, AL	Tennessee Valley Authority	2
Browns Ferry 2 05000260	BWR	10 MI NW of Decatur, AL	Tennessee Valley Authority	2
Browns Ferry 3 05000296	BWR	10 MI NW of Decatur, AL	Tennessee Valley Authority	2
Brunswick 1 05000325	BWR	2 MI N of Southport, NC	Carolina Power & Light Co.	2

Brunswick 2 05000324	BWR	2 MI N of Southport, NC	Carolina Power & Light Co.	2
Byron 1 05000454	PWR	17 MI SW of Rockford, IL	Exelon Generation Co., LLC	3
Byron 2 05000455	PWR	17 MI SW of Rockford, IL	Exelon Generation Co., LLC	3
Callaway 05000483	PWR	10 MI SE of Fulton, MO	Union Electric Co.	4
Calvert Cliffs 1 05000317	PWR	40 MI S of Annapolis, MD	CCNPPI - subsidiary of Constellation Energy Group	1
Calvert Cliffs 2 05000318	PWR	40 MI S of Annapolis, MD	CCNPPI - subsidiary of Constellation Energy Group	1
Catawba 1 05000413	PWR	6 MI NW of Rock Hill, SC	Duke Energy Corp.	2
Catawba 2 05000414	PWR	6 MI NW of Rock Hill, SC	Duke Energy Corp.	2
Clinton 05000461	BWR	6 MI E of Clinton, IL	AmerGen Energy Co., LLC	3
Columbia Generating Station 05000397	BWR	12 MI NW of Richland, WA	Energy Northwest	4
Comanche Peak 1 05000445	PWR	4 MI N of Glen Rose, TX	TXU Generating Company LP	4
Comanche Peak 2 05000446	PWR	4 MI N of Glen Rose, TX	TXU Generating Company LP	4
Cooper 05000298	BWR	23 MI S of Nebraska City, NE	Nebraska Public Power District	4
Crystal River 3 05000302	PWR	7 MI NW of Crystal River, FL	Florida Power Corp.	2
D.C. Cook 1 05000315	PWR	11 MI S of Benton Harbor, MI	Indiana Michigan Power Co.	3
D.C. Cook 2		11 MI S of Benton		

05000316	PWR	Harbor, MI	Indiana Michigan Power Co.	3
Davis-Besse 05000346	PWR	21 MI ESE of Toledo, OH	FirstEnergy Nuclear Operating Co.	3
Diablo Canyon 1 05000275	PWR	12 MI WSW of San Luis Obispo, CA	Pacific Gas & Electric Co.	4
Diablo Canyon 2 05000323	PWR	12 MI WSW of San Luis Obispo, CA	Pacific Gas & Electric Co.	4
Dresden 2 05000237	BWR	9 MI E of Morris, IL	Exelon Generation Co., LLC	3
Dresden 3 05000249	BWR	9 MI E of Morris, IL	Exelon Generation Co., LLC	3
Duane Arnold 05000331	BWR	8 MI NW of Cedar Rapids, IA	Nuclear Management Co., LLC	3
Farley 1 05000348	PWR	18 MI SE of Dothan, AL	Southern Nuclear Operating Co., Inc.	2
Farley 2 05000364	PWR	18 MI SE of Dothan, AL	Southern Nuclear Operating Co., Inc.	2
Fermi 2 05000341	BWR	25 MI NE of Toledo, MI	Detroit Edison Co.	3
FitzPatrick 05000333	BWR	8 MI NE of Oswego, NY	Entergy Nuclear Operations, Inc.	1
Fort Calhoun 05000285	PWR	19 MI N of Omaha, NE	Omaha Public Power District	4
Ginna 05000244	PWR	20 MI NE of Rochester, NY	Rochester Gas & Electric Corp.	1
Grand Gulf 1 05000416	BWR	25 MI S of Vicksburg, MS	Entergy Operations, Inc.	4
Harris 1 05000400	PWR	20 MI SW of Raleigh, NC	Carolina Power & Light Co.	2
Hatch 1 05000321	BWR	11 MI N of Baxley, GA	Southern Nuclear Operating Co., Inc.	2

Hatch 2 05000366	BWR	11 MI N of Baxley, GA	Southern Nuclear Operating Co., Inc.	2
Hope Creek 1 05000354	BWR	18 MI SE of Wilmington, NJ	PSEG Nuclear, LLC	1
Indian Point 2 05000247	PWR	24 MI N of New York City, NY	Entergy Nuclear IP2 LLC	1
Indian Point 3 05000286	PWR	24 MI N of New York City, NY	Entergy Nuclear Operations, Inc.	1
Kewaunee 05000305	PWR	27 MI E of Green Bay, WI	Nuclear Management Corp.	3
La Salle 1 05000373	BWR	11 MI SE of Ottawa, IL	Exelon Generation Co., LLC	3
La Salle 2 05000374	BWR	11 MI SE of Ottawa, IL	Exelon Generation Co., LLC	3
Limerick 1 05000352	BWR	21 MI NW of Philadelphia, PA	Exelon Generation Co., LLC	1
Limerick 2 05000353	BWR	21 MI NW of Philadelphia, PA	Exelon Generation Co., LLC	1
McGuire 1 05000369	PWR	17 MI N of Charlotte, NC	Duke Energy Corp.	2
McGuire 2 05000370	PWR	17 MI N of Charlotte, NC	Duke Energy Corp.	2
Millstone 2 05000336	PWR	3.2 MI WSW of New London, CT	Dominion Nuclear Connecticut, Inc.	1
Millstone 3 05000423	PWR	3.2 MI WSW of New London, CT	Dominion Nuclear Connecticut, Inc.	1
Monticello 05000263	BWR	30 MI NW of Minneapolis, MN	Nuclear Management Co.	3
Nine Mile Point 1 05000220	BWR	6 MI NE of Oswego, NY	NMPNS - a subsidiary of Constellation Energy Group	1
Nine Mile Point 2 05000410	BWR	6 MI NE of Oswego, NY	NMPNS - a subsidiary of Constellation Energy Group	1

North Anna 1 05000338	PWR	40 MI NW of Richmond, VA	Virginia Electric & Power Co.	2
North Anna 2 05000339	PWR	40 MI NW of Richmond, VA	Virginia Electric & Power Co.	2
Oconee 1 05000269	PWR	30 MI W of Greenville, SC	Duke Energy Corp.	2
Oconee 2 05000270	PWR	30 MI W of Greenville, SC	Duke Energy Corp.	2
Oconee 3 05000287	PWR	30 MI W of Greenville, SC	Duke Energy Corp.	2
Oyster Creek 05000219	BWR	9 MI S of Toms River, NJ	AmerGen Energy Co., LLC	1
Palisades 05000255	PWR	5 MI S of South Haven, MI	Nuclear Management Co., LLC	3
Palo Verde 1 05000528	PWR	36 MI W of Phoenix, AZ	Arizona Public Service Co.	4
Palo Verde 2 05000529	PWR	36 MI W of Phoenix, AZ	Arizona Public Service Co.	4
Palo Verde 3 05000530	PWR	36 MI W of Phoenix, AZ	Arizona Public Service Co.	4
Peach Bottom 2 05000277	BWR	17.9 MI S of Lancaster, PA	Exelon Generation Co., LLC	1
Peach Bottom 3 05000278	BWR	17.9 MI S of Lancaster, PA	Exelon Generation Co., LLC	1
Perry 1 05000440	BWR	7 MI NE of Painesville, OH	FirstEnergy Nuclear Operating Co.	3
Pilgrim 1 05000293	BWR	4 MI SE of Plymouth, MA	Entergy Nuclear Generation Company	1
Point Beach 1 05000266	PWR	13 MI NNW of Manitowoc, WI	Nuclear Management Co., LLC	3
Point Beach 2 05000301	PWR	13 MI NNW of Manitowoc, WI	Nuclear Management Co., LLC	3

Prairie Island 1 05000282	PWR	28 MI SE of Minneapolis, MN	Nuclear Management Co.	3
Prairie Island 2 05000306	PWR	28 MI SE of Minneapolis, MN	Nuclear Management Co.	3
Quad Cities 1 05000254	BWR	20 MI NE of Moline, IL	Exelon Generation Co., LLC	3
Quad Cities 2 05000265	BWR	20 MI NE of Moline, IL	Exelon Generation Co., LLC	3
River Bend 1 05000458	BWR	24 MI NNW of Baton Rouge, LA	Entergy Operations, Inc.	4
Robinson 2 05000261	PWR	26 MI from Florence, SC	Carolina Power & Light Co.	2
Saint Lucie 1 05000335	PWR	12 MI SE of Ft. Pierce, FL	Florida Power & Light Co.	2
Saint Lucie 2 05000389	PWR	12 MI SE of Ft. Pierce, FL	Florida Power & Light Co.	2
Salem 1 05000272	PWR	18 MI S of Wilmington, DE	PSEG Nuclear, LLC	1
Salem 2 05000311	PWR	18 MI S of Wilmington, DE	PSEG Nuclear, LLC	1
San Onofre 2 05000361	PWR	4 MI SE of San Clemente, CA	Southern California Edison Co.	4
San Onofre 3 05000362	PWR	4 MI SE of San Clemente, CA	Southern California Edison Co.	4
Seabrook 1 05000443	PWR	13 MI S of Portsmouth, NH	North Atlantic Energy Service Corporation	1
Sequoyah 1 05000327	PWR	9.5 MI NE of Chattanooga, TN	Tennessee Valley Authority	2
Sequoyah 2 05000328	PWR	9.5 MI NE of Chattanooga, TN	Tennessee Valley Authority	2
South Texas 1 05000498	PWR	12 MI SSW of Bay City, TX	STP Nuclear Operating Co.	4

South Texas 2 05000499	PWR	12 MI SSW of Bay City, TX	STP Nuclear Operating Co.	4
Summer 05000395	PWR	26 MI NW of Columbia, SC	South Carolina Electric & Gas Co.	2
Surry 1 05000280	PWR	17 MI NW of Newport News, VA	Virginia Electric & Power Co.	2
Surry 2 05000281	PWR	17 MI NW of Newport News, VA	Virginia Electric & Power Co.	2
Susquehanna 1 05000387	BWR	7 MI NE of Berwick, PA	PPL Susquehanna, LLC	1
Susquehanna 2 05000388	BWR	7 MI NE of Berwick, PA	PPL Susquehanna, LLC	1
Three Mile Island 1 05000289	PWR	10 MI SE of Harrisburg, PA	AmerGen Energy Co., LLC	1
Turkey Point 3 05000250	PWR	25 MI S of Miami, FL	Florida Power & Light Co.	2
Turkey Point 4 05000251	PWR	25 MI S of Miami, FL	Florida Power & Light Co.	2
Vermont Yankee 05000271	BWR	5 MI S of Battleboro, VT	Entergy Nuclear Operations, Inc.	1
Vogtle 1 05000424	PWR	26 MI SE of Augusta, GA	Southern Nuclear Operating Co., Inc.	2
Vogtle 2 05000425	PWR	26 MI SE of Augusta, GA	Southern Nuclear Operating Co., Inc.	2
Waterford 3 05000382	PWR	20 MI W of New Orleans, LA	Entergy Operations, Inc.	4
Watts Bar 1 05000390	PWR	10 MI S of Spring City, TN	Tennessee Valley Authority	2
Wolf Creek 1 05000482	PWR	3.5 MI NE of Burlington, KS	Wolf Creek Nuclear Operating Corp.	4

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Fact Sheet

United States Nuclear Regulatory Commission
Office of Public Affairs
Washington DC 20555
Telephone: 301/415-8200 E-mail: opa@nrc.gov

Decommissioning Nuclear Power Plants

Background

When a power company decides to close its nuclear power plant permanently, the facility must be decommissioned by safely removing it from service and reducing residual radioactivity to a level that permits release of the property and termination of the operating license. The Nuclear Regulatory Commission has strict rules governing nuclear power plant decommissioning involving cleanup of radioactively contaminated plant systems and structures and removal of the radioactive fuel. These requirements protect workers and the public during the entire decommissioning process and the public after the license is terminated.

Discussion

Decommissioning involves three different alternatives: DECON, SAFSTOR, or ENTOMB.

- Under DECON (immediate dismantlement), soon after the nuclear facility closes, equipment, structures, and portions of the facility containing radioactive contaminants are removed or decontaminated to a level that permits release of the property and termination of the NRC license.

- Under SAFSTOR, often considered "delayed DECON," a nuclear facility is maintained and monitored in a condition that allows the radioactivity to decay; afterwards, it is dismantled.

- Under ENTOMB, radioactive contaminants are encased in a structurally sound material such as concrete and appropriately maintained and monitored until the radioactivity decays to a level permitting release of the property.

The plant owner may also choose to adopt a combination of the first two choices in which some portions of the facility are dismantled or decontaminated while other parts of the facility are left

in SAFSTOR. The decision may be based on factors besides radioactive decay such as availability of waste disposal sites.

To be acceptable, decommissioning must be completed within 60 years. A time beyond that would be considered only when necessary to protect public health and safety in accordance with NRC regulations.

Regulations

The requirements for decommissioning a nuclear power plant are set out in NRC regulations (Title 10 of the Code of Federal Regulations, part 20 subpart E, and parts 50.75, 50.82, 51.53, and 51.95). In August 1996, a revised rule went into effect that redefined the decommissioning process and required owners to provide the NRC with early notification of planned decommissioning activities. The rule allows no major decommissioning activities to be undertaken until after certain information has been provided to the NRC and the public

Several opportunities are provided for public involvement during the decommissioning process. The NRC holds a meeting in the vicinity of the plant to discuss the decommissioning process and to invite public comments and questions. NRC approval and issuance of a license amendment is required for changes to the plant license and decommissioning activities that could adversely impact the public. The license amendment process provides an opportunity for a public hearing. Additionally, a license termination plan must be approved by license amendment, thus providing another hearing opportunity for affected members of the public.

Also, as a result of recent deregulation of the electric power industry, NRC now requires nuclear power plant owners to report to the agency the status of their decommissioning funds at least once every two years and annually within five years of the planned end of plant operation. This requirement went into effect in late 1998.

Phases of Decommissioning

The requirements for power reactor decommissioning activities may be divided into three phases: (1) initial activities; (2) major decommissioning and storage activities; and (3) license termination activities as discussed below.

(1) Initial Activities

When a nuclear power plant owner decides to cease operations permanently, it must submit a written certification of permanent cessation of operation to the NRC within 30 days. When radioactive nuclear fuel is permanently removed from the reactor vessel, the owner must submit another written certification to the NRC, thus losing authority to operate the reactor or load fuel into the reactor vessel. This eliminates the obligation to adhere to certain requirements needed only during reactor operation.

Within two years after submitting the certification of permanent closure, the owner must submit a post-shutdown decommissioning activities report (PSDAR) to the NRC. This report provides a description of the planned decommissioning activities, along with a schedule for accomplishing them, and an estimate of the expected costs. The PSDAR must discuss the reasons for concluding that environmental impacts associated with the site-specific decommissioning activities have already been addressed in previous environmental analyses. Otherwise, the owner must request a license amendment for approval of the activities and submit to the NRC a report on the additional impacts of decommissioning on the environment.

After receiving a PSDAR, the NRC publishes a notice of receipt in the Federal Register, makes the report available for public review and comment, and holds a public meeting in the vicinity of the plant to discuss the owner's intentions.

2) Major Decommissioning Activities

Ninety days after the NRC receives the PSDAR, and generally 30 days after the public meeting, the owner can begin major decommissioning activities without specific NRC approval. These activities could include permanent removal of such major components as the reactor vessel, steam generators, large piping systems, pumps, and valves.

However, decommissioning activities conducted without specific prior NRC approval must not:

--prevent release of the site for possible unrestricted use,
--result in there being no reasonable assurance that adequate funds will be available for decommissioning, or
--cause any significant environmental impact not previously reviewed.

If any decommissioning activity does not meet these terms, the owner is required to submit a license amendment request, which would provide an opportunity for a public hearing.

Initially, the owner can use up to three percent of its funds set aside for decommissioning without prior NRC approval. An additional 20 percent can be used 90 days after submittal of the PSDAR. The remaining decommissioning trust funds are then available when the owner submits a detailed site-specific cost estimate to the NRC.

3) License Termination Activities

The plant owner is required to submit a License Termination Plan (LTP) within two years of the expected license termination. The plan addresses each of the following: site characterization, identification of remaining site dismantlement activities, plans for site remediation, detailed plans for final radiation surveys for release of the site, method for demonstrating compliance with the radiological criteria for license termination, updated site-specific estimates of remaining decommissioning costs, and a supplement to the environmental report that describes any new

information or significant environmental changes associated with the owner's proposed termination activities. For a plan proposing release of the site for restricted use, it must describe the site's end use, documentation on public consultation, institutional controls, and financial assurance needed to comply with the requirements for license termination for restricted release.

The LTP requires approval by NRC of a license amendment. Before approval can be given, an opportunity for hearing is published and a public meeting is held near the plant site.

The NRC uses a standard review plan (NUREG-1700, "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans)" to ensure high quality and uniformity of LTP reviews. The standard review plan is available to the public so that NRC's review process is understood clearly.

If the remaining dismantlement has been performed in accordance with the approved LTP and the termination survey demonstrates that the facility and site are suitable for release, the NRC issues a letter terminating the operating license.

Rulemaking

The NRC has been considering new regulations that would reduce requirements for emergency planning, onsite and offsite insurance, and safeguards for permanently shutdown plants in a step-wise fashion as the potential for offsite releases decreases with time after plant shutdown. The new regulations would address staffing, training, and backfit applicability to decommissioning.

As a result of the terrorist attacks on September 11, 2001, the Chairman directed the staff to thoroughly reevaluate the NRC's safeguards and physical security programs. In connection with this assessment, the staff believes that regulatory relief for decommissioning emergency planning and insurance requirements is inseparable from safeguards considerations. Once the safeguards issues are resolved, the staff will submit a policy options paper or develop a rulemaking for Commission consideration.

A final rulemaking for partial site release was approved by the Commission on March 7, 2003. Current rules provide adequate protection of the public and the environment from radioactivity remaining at a reactor site when the reactor license is terminated following decommissioning. However, it is possible for a reactor owner to sell land that would reduce the size of its site before the license termination criteria would specifically apply to the release of the property. This rulemaking standardizes the process for allowing an owner to release part of its reactor facility or site for unrestricted use before receiving NRC approval of its license termination plan (LTP).

Additionally, the NRC has deferred rulemaking that would clarify the use of the "ENTOMB" option for power reactors pending completion of research studies on entombment viability issues. SECY-02-0191, dated October 25, 2002, outlines the reasons for deferral of this rulemaking.

Permanently Shutdown Nuclear Power Plants

There are currently 19 nuclear power plant units that have permanently shut down and are in some phase of the decommissioning process. These are:

-- Big Rock Point Plant
-- Dresden Nuclear Power Station, Unit 1;
-- GE VBWR (Vallecitos)
– Haddam Neck - Connecticut Yankee Plant
-- Humboldt Bay Power Plant, Unit 3
-- Fermi 1 Power Plant;
-- Indian Point Unit 1
-- LaCrosse Boiling Water Reactor
-- Maine Yankee Atomic Power Station
-- Millstone Nuclear Power Station, Unit 1
-- Peach Bottom Unit 1
-- Rancho Seco Nuclear Generating Station
-- Saxton
-- San Onofre Nuclear Generating Station, Unit 1
-- Three Mile Island Nuclear Station, Unit 2
-- Trojan Nuclear Plant
-- Yankee Rowe Nuclear Station; and
-- Zion Nuclear Power Station, Units 1 and 2

These are described in greater detail in the material that follows.

Four nuclear power plants have completed the decommissioning process and have had their operating license terminated. These are:

-- Fort St. Vrain Nuclear Generating Station
-- Shoreham Nuclear Power Station
-- CTVR (Pressurized Tube, Heavy Water); and
-- Pathfinder (Superheat BWR).

Table 1

Power Reactors in the Decommissioning Process

BIG ROCK POINT

The plant shut down on August 30, 1997. Fuel was transferred to the spent fuel pool by September 20, 1997. The owner submitted certification of permanent cessation of operations on June 26, 1997, and certification of permanent fuel removal on September 23, 1997. The owner submitted their decommissioning plan on February 27, 1995 which was considered to be the post-shutdown decommissioning activities report (PSDAR) and has subsequently been updated. The PSDAR public meeting was held on November 13, 1997. The owner selected the DECON option. Under the current schedule, the operating license is planned to be terminated in 2005. The owner has loaded all of the spent fuel from the pool into transportable dry storage systems at an on-site interim storage facility.

DRESDEN - UNIT 1

The plant shut down in October 1978 and is currently in SAFSTOR. The decommissioning plan was approved in September 1993. No significant dismantlement activities are underway. Asbestos removal, isolation of Unit 1 from Units 2 and 3, and general radiation cleanup activities are complete or in progress. The owner will dismantle Unit 1 when the other two units onsite are ready to be dismantled - which is expected no earlier than 2011. The owner submitted an updated post-shutdown decommissioning activities report (PSDAR) on June 1, 1998. The PSDAR public meeting was held on July 23, 1998. The owner has loaded all of the spent fuel from the pool into transportable dry storage systems at an on-site interim storage facility.

GE- VBWR (VALLECITOS)

The plant was shut down in December 1963. The plant is in SAFSTOR and there are no plans for any significant dismantlement in the foreseeable future. All nuclear fuel has been removed from the site.

HADDAM NECK - CONNECTICUT YANKEE

The plant was shut down on July 22, 1996. The fuel was removed from the reactor vessel on November 5, 1996. The owner submitted certification of permanent cessation of operations on December 5, 1996. The post-shutdown decommissioning activities report (PSDAR) was submitted August 22, 1997. The PSDAR public meeting was held on October 27, 1997. The owner submitted a License Termination Plan (LTP) on July 7, 2000. A public meeting on the LTP was held October 17, 2000. NRC completed its review of the LTP on November 25, 2002. The owner is using the DECON option.

In April 1999, Connecticut Yankee Atomic Power Company (CYAPCO) contracted Bechtel Power Corporation as the Decommissioning Operations Contractor. Decontamination and dismantlement activities, consistent with the PSDAR, are ongoing at the site. Major components have been removed including the steam generators and pressurizer. The reactor vessel removal is expected during 2003. The owner plans to move the spent fuel assemblies stored in its spent fuel pool to transportable dry storage systems at an on-site interim storage facility. The owner is considering selling part of the site for use as a natural gas-fired electric plant.

HUMBOLDT BAY

The plant was shut down in July 1976. The plant is in SAFSTOR. The decommissioning plan was approved in July 1988. The owner is evaluating the feasibility of early dismantlement with license termination in 2005. The 250-ft ventilation stack was replaced with a 50-ft vent stack that is less vulnerable to seismic-induced damage. An updated post-shutdown decommissioning activities report (PSDAR) was submitted on February 27, 1998. In September 1997 the owner successfully repaired groundwater leaks into the reactor building caisson. The grout injection effort reduced in leakage from about 7000 gal/day to less than 15 gal/day.

The licensee submitted an ISFSI application in December 2003. The ISFSI dry storage cask will be unique due to the short length of the Humboldt fuel assemblies. Furthermore, the casks will be stored below-grade to accommodate regional seismicity issues, security concerns, and site boundary dose limits. Review and approval of the ISFSI application is estimated to take 2 years. If the ISFSI application is approved, a decision will then be made on whether to proceed with ISFSI construction. In conjunction with the ISFSI decision, PG&E is involved in a study to determine if the schedule for completion of the Unit 3 site decommissioning should be accelerated to a milestone much earlier than the currently published 2015 date.

Decommissioning work at Humboldt Bay involves recently completed asbestos removal, currently in progress systems and structures radiological characterization, and near term future work on reactor and internals activation analysis, LLW management plan development, developing of a work, cost, and scheduling process, and the developing of a facilities and staffing plan. This work phase will likely continue until a decision is made on early decommissioning.

FERMI - UNIT 1

The plant was shut down in September 1972. The plant is currently in SAFSTOR. The spent fuel has been removed from the site. Owner is performing occupational safety enhancement activities, concentrating in non-radioactive areas, such as asbestos removal. Bulk sodium has been removed from the site. The post-shutdown decommissioning activities report public meeting was held on April 22, 1998. Owner plans to submit its license termination plan in 2003.

INDIAN POINT - UNIT 1

The plant was shut down in October 1974. The order approving SAFSTOR was issued in January 1996. Currently there is no significant dismantlement underway. The owner plans to decommission Unit 1 concurrently with Unit 2, which remains in operation. The post-shutdown decommissioning activities report public meeting was held on January 20, 1999.

LA CROSSE

The plant was shut down on April 30, 1987. The SAFSTOR decommissioning plan (DP) was approved August 7, 1991. The DP is considered the post-shutdown decommissioning activities report (PSDAR). The PSDAR public meeting was held on May 13,1998. Limited and gradual dismantlement is currently underway. The owner is a member of the Private Fuel Storage LLC seeking a license to build and operate an independent spent fuel storage installation on the reservation of the Skull Valley Band of Goshute Indians west of Salt Lake City, Utah. The owner has no immediate plans for an onsite independent spent fuel storage installation.

MAINE YANKEE

The plant was shut down on December 6, 1996. The transfer of fuel to the spent fuel pool was completed on June 20, 1997. Certification of permanent cessation of operations was submitted on August 7, 1997. The post-shutdown decommissioning activities report (PSDAR) was submitted on August 27, 1997, and the PSDAR public meeting was held on November 6, 1997. The owner selected DECON as the decommissioning option.

A decommissioning and decontamination contract was awarded to Stone & Webster Engineering Corporation (SWEC) on August 4, 1998. The plant was de-powered on December 30,1998, to a "cold, dark plant" status for turnover to SWEC.

The License Termination Plan (LTP) was submitted on January 13, 2000, and a public meeting was held on May 15. The plan proposed to dispose of portions of above-grade concrete from demolished buildings by "rubblizing" the material and leaving it onsite in building foundations. The State of Maine and the Friends of the Coast Opposing Nuclear Pollution (FTOC) filed separate petitions to intervene in response to the license amendment associated with the LTP. On July 20, 2000, the NRC Atomic Safety and Licensing Board (ASLB) determined that the proceeding should be held in abeyance until Maine Yankee Atomic Power Company (MYAPC) filed a revised LTP based on legislation enacted by the State of Maine after the submittal of the LTP.

On September 13, 2000, MYAPC announced that it was revising its plan for disposing of concrete from demolished buildings at the Maine Yankee site. MYAPC decided to dispose of above-grade concrete from demolished buildings by shipping the concrete to offsite disposal facilities rather than place it in the building foundations as it had initially proposed. The portion

of the above-grade concrete that is radiologically contaminated will be shipped by rail to the Envirocare facility in Utah. Since July 2000, MYAPC has been its own general contractor after terminating the decommissioning contract due to SWEC's impending bankruptcy.

MYAPC submitted Revision 1 to the LTP on June 1, 2001, and submitted Revision 2 on August 13, 2001. On August 21, 2001, MYAPC, the State of Maine, and FOTC requested that the ASLB proceeding be terminated. On October 2, 2001, the ASLB issued an order terminating the proceeding. MY submitted Revision 3 of the LTP in October 2002. The NRC staff approved the LTP, and issued License Amendment 168 incorporating the approved LTP into MY's license on February 28, 2003. The owner is transferring fuel from the spent fuel pool into transportable dry storage systems at an on-site interim storage facility.

MILLSTONE - UNIT 1

Unit 1 was shut down on November 4, 1995. Certifications per 10 CFR Part 50.82(a) were submitted July 21, 1998. The owner's current plan is to leave the plant in SAFSTOR until the Unit 2 license expires. The owner submitted its required post-shutdown decommissioning activities report (PSDAR) on June 14, 1999. The owner has chosen a combination of the DECON and SAFSTOR options. The NRC conducted public meetings in Waterford, CT., on the decommissioning process on February 9, 1999, and on the PSDAR on August 25,1999. The owner plans to move the spent fuel assembles stored in its spent fuel pool to transportable dry storage systems at an on-site interim storage facility. Owner responsibility for the Millstone site was transferred from Northeast Utilities to Dominion Nuclear Connecticut on March 12, 2001.Unit 1 is currently in a cold, dark, and dry condition except for the spent fuel pool "island."

PEACH BOTTOM - UNIT 1

The plant was shut down in October 1974. The plant is in SAFSTOR with no significant dismantlement underway. Unit 1 active decommissioning is not expected until 2015 when Peach Bottom Units 2 and 3 are scheduled to shut down. The post-shutdown decommissioning activities report public meeting was held on June 29, 1998. The spent fuel has been removed from the site.

RANCHO SECO

The plant was shut down in June 1989. The SAFSTOR decommissioning plan was approved in March 1995. The owner has revised its decommissioning plan to use an incremental dismantlement approach. Currently, the owner is dismantling the secondary side of the plant. Wastes generated during decommissioning will be shipped to Envirocare. In July 1999 the owner decided to continue dismantlement activities with the goal of completing the decommissioning by 2008. On October 4, 1991, the owner submitted a site-specific Part 72 independent spent fuel storage installation (ISFSI) application using the VECTRA NUHOMS-MP187 dual purpose cask

design. The license was granted on June 30, 2000. The owner has loaded all of the spent fuel from the pool into transportable dry storage systems at an on-site interim storage facility.

SAXTON

The plant was shut down in May 1972, and in February 1975 was placed in SAFSTOR until 1986, when phased dismantlement began with removal of support buildings, contaminated soil, and some material in the containment. The owner submitted a decommissioning plan in 1996, which became the PSDAR. All spent fuel has been removed from the site. The NRC approved an amendment request in 1998 to allow dismantlement under 50.59. The reactor vessel with internals, steam generator, and pressurizer have been shipped to Barnwell for disposal. The owner submitted a License Termination Plan (LTP) in February 1999, but had to resubmit the plan in February 2000 to provide sufficient information for an acceptance review. A public meeting on the LTP was held on May 25, 2000, at the Saxton Fire Hall to inform the public of the plan and receive public comments. The NRC is actively reviewing the LTP and is scheduled to complete the review by Second Quarter of 2003. The owner expects to complete decommissioning so the license can be terminated in the third or fourth quarter of 2003 and the site restored by the first quarter of 2004.

SAN ONOFRE - UNIT 1

The plant was shut down in November 1992. The licensee submitted an updated PSDAR on December 15, 1998. The PSDAR public meeting was held on February 25, 1999. The facility transitioned from SAFSTOR in 1999 and is now in active decommissioning (DECON). Significant dismantlement is currently underway. The licensee has completed demolition of the Emergency Diesel Generator building, the Control Building, and Administration Building. Dismantlement and removal of the electrical generator and main turbine is also complete. The licensee has completed reactor pressure vessel internal segmentation and cutup. The reactor internals abrasive cutting media has been sent to disposal. The top of the Containment Sphere Enclosure Building has been dismantled and most large reactor system components removed including the reactor pressure vessel, pressurizer and steam generators. The steam generators and pressurizer have been shipped to disposal. Arrangements for reactor pressure vessel disposal are still ongoing. The control room has been relocated and Unit 1 has established its spent fuel pool island concept with the rest of the Unit 1 facility cold and dark. Major security modifications to isolate Units 2 and 3 from the Unit 1 are complete.

In addition, asbestos removal and abatement is ongoing. Over 10 million lbs of waste have been shipped for disposal to date.

ISFSI construction is underway. The ISFSI application has been approved and a certificate of compliance was issued in January 2003. The transfer of Unit 1 spent fuel being stored in the Unit 3 spent fuel pool is underway.

THREE MILE ISLAND - UNIT 2

The operating reactor accident occurred in March 1979. Plant de-fueling was completed in April 1990. Post De-fueling Monitored Storage was approved in 1993. There is no significant dismantlement underway. The plant shares equipment with the other operating unit, which was sold to Amergen in 1999. GPU Nuclear retains the license for TMI-2 and contracts to Amergen for maintenance and surveillance activities. Both units are currently expected to be decommissioned together in 2014. The spent fuel was removed except for some debris in the primary systems. The removed fuel is currently in storage at the Idaho National Engineering and Environmental Laboratory. The Department of Energy has taken title and possession of the fuel.

TROJAN

The plant was shut down in November 1992. The DECON decommissioning plan was approved in April 1996. The plant is currently undergoing dismantlement. The steam generators and reactor vessel have been shipped to Hanford LLW site. The owner was granted a site-specific license for an onsite ISFSI in March 1999. The owner submitted a License Termination Plan (LTP) in August of 1999 and a public meeting was held in St. Helens, Oregon on December 7, 1999. A license amendment was issued in February 2001, approving the LTP. The owner has completed transferring fuel from the spent fuel pool into transportable dry storage systems at an on-site interim storage facility. Following decommissioning of the spent fuel pool, the termination of the operating license is projected for 2005.

YANKEE ROWE

The plant was permanently shut down on October 1, 1991. The DECON decommissioning plan was approved in February 1995 and the plant is undergoing dismantlement. The steam generators were shipped to the Barnwell, North Carolina low level waste facility in November 1993. The reactor vessel was shipped in April 1997 to Barnwell. The owner has removed all of the primary systems, secondary side components, and switch yard equipment from the site. The plant is about 80 percent dismantled. The containment and other major structures remain. The owner has completed construction of an onsite independent spent fuel storage installation (ISFSI). A license termination plan (LTP) was submitted in May 1997, and a public meeting was held to discuss the LTP in January 1998. A public hearing was requested on the LTP but was canceled after the owner withdrew the plan in May 1999 to consider the MARSSIM approach. The licensee intends to resubmit the LTP in 2003. The owner has completed transferring fuel from the spent fuel pool into transportable dry storage systems at an on-site interim storage facility.

ZION - UNITS 1 AND 2

Zion Units 1 and 2 were permanently shut down on February 13, 1998. The fuel was transferred to the spent fuel pool, and the owner submitted the certification of fuel transfer on March 9, 1998. A public meeting was held on June 1, 1998, to inform the public of the shutdown plans.

The owner has converted the turbine-generators into synchronous condensers and have isolated the spent fuel pool within a fuel building "nuclear island." The plant has been placed in SAFSTOR, where it will remain until about 2013 when the decommissioning trust fund will be sufficient to conduct DECON activities. The owner will retain the spent fuel until it is accepted by the Department of Energy. The owner submitted the post-shutdown decommissioning activities report (PSDAR), site-specific cost estimate, and fuel management plan on February 14, 2000. A public meeting to discuss the PSDAR was held on April 26, 2000.

Table 2
Decommissioning Status for Shut Down Power Reactors (As of Jan. 2004)

Reactor	Type	Thermal Power	Location	Shutdown	Status	Fuel Onsite
Indian Point I	PWR	615 MW	Buchanan, NY	10/31/74	SAFSTOR	Yes
Dresden I	BWR	700 MW	Morris, IL	10/31/78	SAFSTOR	Yes
Fermi I	Fast Breeder	200 MW	Monroe Co., MI	9/22/72	SAFSTOR	No
GE VBWR	BWR	50 MW	Alameda Co., CA	12/9/63	SAFSTOR	No
Yankee Rowe	PWR	600 MW	Franklin Co., MA	10/1/91	DECON	Yes
CVTR	Pressure Tube, Heavy Water	65 MW	Parr, SC	1/67	License Terminated	No
Big Rock Point	BWR	67 MW	Charlevoix, MI	8/97	DECON	Yes
Pathfinder	Superheat BWR	190 MW	Sioux Falls, SD	9/16/67	DECON NRC Part 30	No
Humboldt Bay 3	BWR	200 MW	Eureka, CA	7/02/76	SAFSTOR	Yes
Peach Bottom I	HTGR	115 MW	York Co., PA	10/31/74	SAFSTOR	No
San Onofre I	PWR	1347 MW	San Clemente, CA	11/30/92	DECON	Yes
Haddam Neck	PWR	1825 MW	Haddam Neck, CT	7/22/96	DECON	Yes
Fort St. Vrain	HTGR	842 MW	Platteville, CO	8/18/89	License Terminated	Yes
Millstone I	BWR	2011 MW	Waterford, CT	11/04/95	DECON	Yes
Zion I	PWR	3250 MW	Zion, IL	2/98	SAFSTOR	Yes
Zion 2	PWR	3250 MW	Zion, IL	2/98	SAFSTOR	Yes
Main Yankee	PWR	2772 MW	Bath, ME	12/96	DECON	Yes
Rancho Seco	PWR	2772 MW	Sacramento, CA	6/7/89	DECON	Yes
Three Mile Island 2	PWR	2772 MW	Middletown, PA	3/28/79	SAFSTOR*	No
Saxton	PWR	28 MW	Saxton, PA	5/72	DECON	No
Shoreham	BWR	2436 MW	Suffolk Co., NY	6/28/89	License Terminated	No
Trojan	PWR	3411 MW	Portland, OR	11/9/92	DECON	Yes
LaCrosse	BWR	165 MW	LaCrosse, WI	4/30/87	SAFSTOR	Yes

* Post-defueling monitored storage (PDMS).

List of Research and Test Reactors

Map of Research and Test Reactor Sites

Licensee / Location	Reactor Type / OL Issued	License Type / Docket Number	License Number
Aerotest San Ramon, CA	Triga (Indus) 07/02/1965	OL 50-228	R-98
Armed Forces Radiobiology Research Institute Bethesda, MD	Triga 06/26/1962	OL 50-170	R-84
Cornell University Ithaca, NY	Triga Mark II 01/11/1962	OL 50-157	R-80
Dow Chemical Company Midland, MI	Triga 07/03/1967	OL 50-264	R-108
General Electric Company Pleasanton, CA	Nuclear Test 10/31/1957	OL 50-73	R-33
Idaho State University Pocatello, ID	AGN-201 #103 10/11/1967	OL 50-284	R-110
Kansas State University Manhattan, KS	Triga 10/16/1962	OL 50-188	R-88
Massachusetts Institute of Technology Cambridge, MA	HWR Reflected 06/09/1958	OL 50-20	R-37
McClellan AFB Sacramento, CA	Triga 08/13/98	OL 50-607	R-130
National Institute of Standards & Technology Gaithersburg, MD	Nuclear Test 06/30/1970	OL 50-184	TR-5

North Carolina State University Raleigh, NC	Pulstar 08/25/1972	OL 50-297	R-120
Ohio State University Columbus, OH	Pool 02/24/1961	OL 50-150	R-75
Oregon State University Corvallis, OR	Triga Mark II 03/07/1967	OL 50-243	R-106
Pennsylvania State University University Park, PA	Triga 07/08/1955	OL 50-5	R-2
Purdue University West Lafayette, IN	Lockheed 08/16/1962	OL 50-182	R-87
Reed College Portland, OR	Triga Mark I 07/02/1968	OL 50-288	R-112
Rensselaer Polytechnic Institute Troy, NY	Critical Assembly 07/03/1964	OL 50-225	CX-22
Rhode Island Atomic Energy Commission Narragansett, RI	GE Pool 07/21/1964	OL 50-193	R-95
Texas A&M University College Station, TX	AGN-201M #106 08/26/1957	OL 50-59	R-23
Texas A&M University College Station, TX	Triga 12/07/1961	OL 50-128	R-128
U.S. Geological Survey Denver, CO	Triga Mark I 02/24/1969	OL 50-274	R-113
University of Arizona Tucson, AZ	Triga Mark I 12/05/1958	OL 50-113	R-52
University of California/Irvine Irvine, CA	Triga Mark I 11/24/1969	OL 50-326	R-116
University of Florida Gainesville, FL	Argonaut 05/21/1959	OL 50-83	R-56
University of Lowell Lowell, MA	GE Pool 12/24/1974	OL 50-223	R-125
University of Maryland College Park, MD	Triga 10/14/1960	OL 50-166	R-70
University of Michigan Ann Arbor, MI	Pool 09/13/1957	OL 50-2	R-28
University of Missouri/Rolla	Pool	OL	R-79

Rolla, MO	11/21/1961	50-123	
University of Missouri/Columbia Columbia, MO	Tank 10/11/1966	OL 50-186	R-103
University of New Mexico Albuquerque, NM	AGN-201M#112 09/17/1966	OL 50-252	R-102
University of Texas Austin, TX	Triga Mark II 01/17/1992	OL 50-602	R-92
University of Utah Salt Lake City, UT	Triga Mark I 09/30/1975	OL 50-407	R-126
University of Virginia Charlottesville, VA	Pool 06/27/1960	OL 50-62	R-66
University of Wisconsin Madison, WI	Triga 11/23/1960	OL 50-156	R-74
Veterans Administration Omaha, NE	Triga 06/26/1959	OL 50-131	R-57
Washington State University Pullman, WA	Triga 03/06/1961	OL 50-27	R-76
Worcester Polytechnic Institute Worcester, MA	GE 12/16/1959	OL 50-134	R-61